VISUAL RESOURCE ASSESSMENT
EAST HAVEN WIND FARM DEMONSTRATION PROJECT

PREPARED FOR

VERMONT DEPARTMENT OF PUBLIC SERVICE

PREPARED BY:

131 Church Street - 3rd Floor
Burlington, Vermont 05401

DECEMBER, 2004

Part I: Project Background

Section A: Scope and Mandate

In January 2004, SE GROUP was retained by the Vermont Department of Public Service to prepare a Visual Resource Assessment of the proposed windfarm demonstration project in East Haven Vermont. As part of this scope we were asked to review and evaluate the visual analysis work completed on behalf of the applicant by T.J. Boyle and Associates and Peter Owens.

The applicant has submitted substantial documentation on the visual resources of the project area, including viewshed analysis, visual resource impact analysis and direct testimony from expert witnesses on the character and nature of the project and its potential to alter the visual environment.

The applicant's goal is to secure a Certificate of Public Good (CPG) for the demonstration project pursuant to the §248 review process. As part of this review, the Pubic Service Board will eventually need to make a determination as to whether or not the project would create an undue adverse condition with respect to aesthetics. The test in Vermont for this condition is commonly referred to as the Quechee Analysis (Quechee).

Our charge under this contract is to: 1) evaluate, critique and assess the applicant's supporting documents and testimony regarding potential aesthetic impacts from the project and, 2) to provide additional recommendations and our professional opinion on whether or not the project constitutes an undue adverse impact on the visual environment. These recommendations will be provided to the Department of Public Service which will incorporate our work into its overall position on the project.

Section B: Methods and Approach

We have employed a multi-faceted technique for evaluation of the project in relationship to visual resources. Firstly, we have thoroughly reviewed the applicant's materials and documents to understand the project scope and scale, its location, characteristics and setting. We have also sought additional information on the project and it's setting from published sources, atlases and statistical records.

Secondly, we have independently evaluated the potential viewshed of the project from various vantage points using Geographic Information System (GIS) tools and techniques. These techniques included development of a three-dimensional triangular irregular network (tin) surface of an area moving outwards from the project approximately 10 miles in all directions totaling over 314 square miles. A more detailed discussion of the computer viewshed modeling can be found in Part II, Section C.

From this viewshed analysis we identified several locations with potential direct views of the project. We conducted four days of site reconnaissance within the project area, verifying viewshed predictions, evaluating previous photographic documentation and cataloging viewshed characteristics. Weather during these visits was not optimal and severely limited our ability to secure quality photographic evidence.

In addition to the viewshed analysis and site visits, we also created a working three-dimensional animated model of the project area based upon site plans and documents available from the applicant. This resource

was used as the basis for developing visual simulations and animations of the proposed project from several key vantage points. A more detailed discussion of the computer visual simulations can be found in Part II, Section E.

The next step in our methodology involved evaluating all of these technical factors (where can it be seen, what would it look like, etc.) against the qualities and sensitivities of the visual environment. We have employed several techniques for this process that blend the quantitative and qualitative aspects of visual analysis. This process is described in detail in Part II, Section F.

These have all been combined into a final analysis of the project using the Quechee approach. We have also evaluated the proposed approach of one of the applicant's experts in regards to a different analysis method than Quechee and urge that the Board reject this recommendation.

Part II: Analysis

Section A: Project Description

The proposed site is along the generally open ridgeline of East Mountain (elevation 3,439) in the Town of East Haven (see Figure 1-1). The ridge is currently home to an abandoned radar installation (North Concord Air Force Station) originally constructed by the US Government in the 1950's and many existing structures and an access road are presently visible. A relatively recent black and white aerial orthophotograph of the site taken in 1999 by the State of Vermont Mapping Program shows the general condition of the ridgeline (See Figure 1). It is our understanding that at least one of the structures (a 64' tall radar installation building) has been removed recently.

The project as described in documents prepared by the applicant includes the installation of four (4) 1.5 MW wind turbines, associated structures and a new transmission line from the summit down to an area near the existing Village of East Haven. A future transmission line between this point and the Burke Substation in Burke is proposed but has not been applied for as part of this application. It is a joint project with Lydonville Electric Department.

The four wind turbines are characterized as GE Wind Energy model 1.5 MW-S, although no specific final design has been selected[1]. The turbine is characterized as being 220 feet to the hub or nacelle, with blades 110 feet in length. The overall height of the structures is stated as 329 feet. Other elements of the plan include use of the existing access road (paved), an underground 34.5kV transmission line, a 34.5kV Hendrix overhead transmission line on 40' utility poles, 17,500 kVA pad-mounted transformers (8'x8') adjacent to each proposed turbine and retention of several existing structures. At least eight other structures are to be removed. One of the retained structures (Building #90) is being proposed as a Cold War Interpretive Center[2]. The radar installation has been designated as an historic site.

Section B: Visual Context

This is a very rural part of the state with a very low residential population and very few public roadways. The area within about 5 miles of the subject ridge generally consists of mixed woodlands on an undulating terrain with a few hamlets along the western edge of the town. Surrounding communities, particularly to the north, south and east are also very rural and rugged. Within these areas, however, are conservation lands obtained during the Champion Lands process that are used by visitors for passive recreational activities. This area is depicted on Figures 2 and 3.

These features and characteristics have been depicted on several plates compiled from available GIS database layers and published data sets. For our analysis, we have used an area of 10 miles from a central point within the project site as the study area. Generally, views of individual structures from such a distance would be difficult at best.

The rugged, rural character of East Mountain is an important consideration when evaluating the project. The landscape

[1] Testimony of Matt Rubin, EHWF-MR, pages 8, 9.

[2] East Haven Wind Farm – Turbine Site Plan. Plan prepared by Bergman & Associates, Inc., EHWF-MR-5

is characterized by a variety of factors; natural and manmade, that ultimately provides a framework in which to evaluate specific changes.

Topography: East Mountain is the highest peak within a series of peaks at the southern edge of the Northeast Kingdom. The area within ten miles of the proposed wind farm ranges in elevation from 801 feet to 3,439 feet at the summit of East Mountain (See Figure 2). The mean elevation within the "population zones" within the study areas is 1,300 feet.[3] In general, this indicates that most of the population is located in the lower elevations of the landscape. Certainly the areas in and around Burke Mountain have some higher elevation development.

North of the project site, the topography flattens considerably within the area generally known as Victory Bog. To the northeast is a smaller area of generally flat topography known as Ferdinand Bog. The topography begins a general downhill trend as it moves eastward approximately nine miles to the Connecticut River.

Within the immediate vicinity of East Mountain the ridgelines and valleys trend towards a more east-west orientation. East Haven Mountain and Burke Mountain (to the south), Bull Mountain and Seneca Mountain (to the north and west) and West Mountain (to the east) all exhibit this characteristic.

It appears that this general orientation creates a striated landform that, when viewed from points to the south, appears as a highly layered composition. Although East Mountain is the highest peak, others including Seneca (3,160 feet), Bull (2,640 feet) and East Haven Mountain (3,060) are quite large and help compose this backdrop. This could mean views from the south would be more likely to see any ridgeline structure as part of this larger composition.

Conversely, this orientation also may allow greater visibility of the project from points east and west. Any ridgeline structures might be seen with little backdrop as individual peaks are discernable. In these cases other landscape factors will have considerable weight and influence over the final perception.

Vegetation: Although a detailed database of local forest cover is not available from any known published source found during our investigation, we were able to take advantage of the LandSat satellite-based data set created in the early 1990's by the Vermont Center for Geographic Information and the University of Massachusetts at Amherst. Although somewhat outdated, we believe that the landscape has not changed so significantly in the past decade so as to reduce its usefulness.

According to this and observation evidence during our field visits, the vegetative pattern is quite varied with a

[3] Elevation ranges were generated from USGS Digital Elevation Models (DEM) for the area. Using these DEMs for an area within 10 miles from the center of the proposed wind farm, SE GROUP has calculated the average elevation of lands within 500 feet of "major" roadways. For the purpose of our analysis, only public roads (Class 1 to 4) were considered "major". The data layer EmergencyE911_RDS was used and is available from the Vermont Center for Geographic Information.

mix of hardwoods and softwoods. Hardwoods tend to be northern hardwoods such as beech, maple, etc. Softwoods tend towards spruce and fir. The pattern appears varied, but with generally higher elevations having a greater percentage of softwood species. Forest cover is extensive at approximately 78%.[4] Figure 2 shows the pattern of vegetation within the project area.

Built Environment: The study area is largely undeveloped. The 17-acres of project site along the ridgeline and the cantonment area (an approximately 30 acre parcel along the access road to the site) are the only major developments within 5 miles of the ridgeline. At about 5 miles from the site we begin to see some development associated with East Haven Village and parts of the Route 114 corridor which moves northward along the western edge of the Town of East Haven.

Within the study area we see a similar pattern; development (roads, housing, infrastructure) to the south and west and undeveloped lands to the north and east. Figure 2 shows the location of major infrastructure and public lands.

Perhaps the most developed portion of the study area is the area in and around Burke Mountain. This area, located approximately 8.5-10 miles from the project site, includes the Burke Mountain Ski Area, associated development near the Darling Hill State Park and single-family developments along the Burke-Green road and several other north-south traverses. Burke Mountain, in this context, is highly visible and a focal point for much of this development.

The transportation network is largely dominated by private logging roads. Route 114 to the west of the study area serves the Village of East Haven and traverses north-south along the Darling Hill area. To the north is Route 105 and to the east is Route 102. There are few major routes in the southern portion of the study area. The most direct route is along the Granby-Burke Road located about 6 miles south of the project site. Within the Town of East Haven, the vast majority of the non-private roadways are located within the southern and western edge of the town.

Further defining the human environment within the study area is the presence of extensive conservation lands that surround the project site. This patchwork of lands includes purchases made by the State of Vermont as part of the Champion Lands deal, lands associated with the Darling State Forest and Maidstone Lake State Park and large tracts of private timberlands owned by Essex Timber Company (ETC) that are under recreational and access easements. In fact, the entire project site is surrounded by these private timberlands.

This level of conservation is somewhat indicative of the general quality of the landscape. A working landscape since the 1850's, the lands have been managed well and have allowed a balance between extraction of timber

[4] The LCLU database classifies the land into several components. Vegetation is one component. SE GROUP estimated overall coverage by summing the areas within the study region that were classified as either hardwood or softwood and dividing by the total.

resources and public recreational access. In both the former Champion Lands (including the West Mountain Wildlife Management Area or WMA) and the ETC lands, recreational access for hunting, fishing, hiking, Nordic skiing, snowmobiling and snowshoeing are allowed.

From our research, it appears that much of this activity is diffuse in nature. The Lands Access Plan for the ETC timberlands states, "existing recreation sites are very limited and primitive…aside from snowmobile trails, are informal and largely have been created by use."[5] Anecdotal evidence from Jim Horton of the Agency of Natural Resources (ANR) indicates that the human presence within these lands is generally sparse.

According to the ANR Department of Forest, Parks and Recreation, a series of focus group meetings were held from September to December 2000 for people familiar with the WMA and the ETC lands. During these meetings, participants were asked to characterize current uses within subregions of the areas. The general characterization was that the "present use was considered light enough to maintain a sense of remoteness. The fall and winter hunting seasons were perceived by participants to have higher use than the spring and summer, and summer use was heavier than spring use."[6]

There are some notable exceptions.

Maidstone Lake State Park, roughly 7 miles from the project site, includes a day use facility, campground and private campsites. ANR puts visitation estimates for the park at 16,000 visitors each year. The park is an obvious summer attraction in the region.

Burke Mountain, located about 9 miles from the project site, allows vehicular access to the summit via a toll road. Conversations with Burke Mountain indicate that summertime visitors can total 50,000. Winter access is via hiking or ski lift.

Lesser areas likely attracting fewer persons include Unknown Pond, South American Pond, and West Mountain WMA. These attractions tend to be more diffuse and passive in character such as fishing, hunting, hiking, camping, etc.

Section C: Viewshed Determination

This study has taken a very pragmatic approach to determination of the viewshed for the proposed project. The viewshed, for the purposes of our work, is defined as the area from which an observer at a height of 48 inches above the ground (someone traveling in a car) can see one or more of the turbine structures associated with the proposed wind farm. While the visual mass of a single turbine is not uniform as you move upward from its base to the tip of the blade, the most conservative approach is to evaluate where any component of the structure can be seen.

For this analysis we used ESRI ArcGIS 8.3 as the GIS to calculate the projected visibility of the wind farm. We are using a height value of 328 feet above the ridgeline for the purpose of this modeling. The software uses the 3D topographic surface

[5] Land Access Plan – Private Timberlands of the Essex Timber Company, LLC. Page IV-3.
[6] Ibid, IV-15.

we have created from USGS Digital Elevation Models and a ray-tracing algorithm to predict where, within ten miles of the project site, any portion of the windfarm is visible. This calculation method relies only on the topographic surface in its determination. As a practical matter this tends to exaggerate the true extent of the viewshed.

The results of this analysis are depicted on Figure 3 and show areas of potential visibility in a purple tone. The yellow circles at the center of the plan depict the approximate location of the four proposed wind turbines. To help emphasize the topographic conditions, a shaded relief of the underlying ground surface is also provided, creating an approximation of 3D.

Within ten miles of the project site, the pattern of potential visibility is oriented generally to the east and south. Within about four miles of the project site, about 70% of the land area is projected to have potential views. Again, this is based only on topographic conditions. Between four and eight miles out, the potential visibility is reduced to less than 50%. Much of this area is focused on the higher elevation ridgelines within the East Haven Range and the hills and mountains in Granby (Mitchell, Spruce, Nurse).

The next step in the viewshed process is to overlay the pattern of woods onto the projected visibility surface to determine where open canopy might allow some views of the project. In reality, the influence of vegetative pattern can be much more dramatic than this simplified overlay. Dense canopy in excess of 60 feet can be a virtual wall, fully screening views of ridges from vantage points nearby or at similar elevations.

Figure 4 presents this overlay. As you will note, the amount of purple (areas of potential visibility) is reduced significantly. The areas that continue to show potential visibility include areas near Ferdinand Bog and Unknown Pond just south of West Mountain, areas along the shoreline of Maidstone Lake, areas near Darling Hill State Forest and some portions of the Burke-Green road to the west of the project site.

This modeling identified four areas where potential visibility is predicted indicating some possible concern. The first is the area in and around Maidstone Lake. The second is the Darling Hill area along a series of roadways that parallel the Route 114 corridor. The third area is the area near Burke Mountain and the toll road. These three areas are less than nine miles from the project site.

Views from the Victory Bog area near the public access point also will afford views to the project. At approximately 9.75 miles from the ridgeline, visibility from the location is distant and will be influenced by atmosphere and weather. The foreground is relatively open with mid-ground hills obscuring areas below the ridgeline of East Mountain. From this vantage point, turbines should appear to fall away to the viewers left.

Views from Madison Basin were also observed during a site walk in the fall of 2004. Although the area is within approximately 3.5 miles of the ridgeline, access is quite difficult and requires either a lengthy hike or four-wheel drive vehicle. Gates along the route were locked and required opening by ANR personnel. Several large clearings within the area provided the best view of the ridgeline.

Section D: Viewshed Sensitivity

As discussed earlier in Section B, this is a relatively rural landscape. This characterization can often imply that new development can result in adverse impacts with respect to aesthetics. To make that assertion, however, requires that we understand the underlying sensitivity of the viewshed and how it will be viewed.

There have been many techniques developed to evaluate impacts to scenic resources. The Vermont Agency of Transportation report entitled "What's Scenic: An analysis of Vermont's current and past scenery evaluation systems"[7] also provided some insight into this issue. This document, prepared as part of the Vermont Scenic Byways Planning Project Statewide Plan - Phase II, includes a very informative discussion on the various technical methods for scenery analysis used in Vermont over the past 30 or so years.

The Vermont Agency of Natural Resources has developed a process for evaluation of impacts to the scenic resources of the state. The Scenic Resource Evaluation Method breaks down the visual context into its component landscape elements. Through this process we can evaluate how specific projects interact with a specific landscape and determine overall sensitivity.

Contrast: *Are there clearly discernable and different landscape elements existing side by side, such as: open meadow and woodlands, water and land; mountains and valleys; village and countryside? It is generally accepted that the more contrast between natural elements of the landscape the greater its scenic qualities.*

This is a quite varied landscape, although largely relegated to more "natural" elements. Within the landform are peaks and rivers, bogs and hills, roads and paths. These elements do have substantial contrast in some locations, particularly near Ferdinand Bog and Unknown Pond, where valleys open up and mountains rise to the west and north.

Order: *Do the natural and cultural features form patterns that make sense in the landscape or are they chaotic and disorienting?*

The east-west orientation of the ridges and valleys within the study area does tend to provide a sense of ordering to the landscape, particularly when viewed from the south. In views from the east and west, the peaks within the study area will create a series of points within the frame of view. East Mountain provides a frame of reference within the landscape that can orient the viewer as it is the highest peak and tends to act as a visual terminus.

Layering: *Is there a succession of landscape elements receding into the distance that provides a sense of depth to the landscape such as: islands and peninsulas in a lake; multiple ridgelines of hills and mountains; a variety of relatively similar building heights in an urban landscape?*

While this landscape does have a series of hillside and mountain peaks, it does not have a strong sense of layering. The orientation of the peaks tends to either stack them as a backdrop or punctuate them as a more linear series of peaks when viewed from certain vantage points. From Victory Bog, for example, the ridgeline appears flat in the background, as the foreground is large in comparison.

[7] Vermont Agency of Transportation, Scenic Byways Program, 1997.

Focal Point: *Is there a point to which your eye is inevitably drawn which enlivens the landscape by its dominance? These focal points tend to be mountain peaks, historic barns, or a church.*

While East Mountain can be a focal point from some vantage points, we believe this has largely been due to the existence of the ridgeline development from the former radar station. These structures are large, dark and with considerable visual mass and probably tend to draw the eye. The ridge of East Mountain itself is not particularly distinct or captivating.

A second focal point within the landscape is Burke Mountain. From the more heavily populated areas along the western edge of the study area, Burke Mountain is a very distinct peak. The presence of ski trails also provides a contrast in the landscape that tends to draw the eye. Heading southward on Route 114 or along Burke-Green Road, Burke Mountain can often be seen in the distance and apart from other hilltops.

Uniqueness: *Does the landscape contain distinctive features that are unique to or symbolic of the region such as a dramatic mountain notch; an unusual style of barn; or a proto-typical village layout?*

The landscape composition of the study area is interesting primarily due to its remoteness. This small portion of the greater Northeast Kingdom could be considered a gateway of sorts, but no one feature sets it apart from other regions. The shape and orientation of the landscape conveys an interesting pattern, but one that may not be readily perceptible to an on ground observer. East Mountain, although higher than the other peaks that surround it, is not so different so as to be unique or iconic.

Intactness: *Have the distinctive natural and/or cultural attributes been retained such as a historic village that has remained largely unaltered over the past century; a large area of actively managed farmland; a sensitively designed resort that complements the natural setting; or an historic streetscape where any new infill construction is compatible with the older buildings?*

This landscape has retained a high degree of intactness. Despite the history of logging and the presence of the radar station at the summit of East Mountain, the overall composition appears to be natural and untouched.

This sense of intactness is further reinforced by the remoteness of the landscape. Views towards East Mountain tend to be long range ones; the closer you get the less you can see.

Overall Composition: We believe that overall, this landscape is sensitive to visual impacts based upon its relative intactness, strong sense of contrast and sense of order. We find that it does not have a strong focal point in East Mountain, nor does it represent a unique landscape within the greater Northeast Kingdom region. We also conclude that the landscape is not visibly layered in a significant way.

Viewers: In order to trigger an aesthetic impact, two things must happen. Firstly, some person must perceive the change. Secondly, they must make an internal and subjective evaluation of the change against some "norm". Within this landscape, the "norm" consists of the previously impacted ridgeline with existing built infrastructure on a relatively remote and non-descript ridgeline.

Within this landscape we believe that the "average" person will be traveling one of

the major roadways or visiting one of the major recreation centers. While we understand the recreational nature of the lands surrounding the project, we believe that in general the users of these lands are not properly classified as "average" persons under Quechee. The majority of users within the ETC and WMA are hunters and snowmobile users. These users must make a concerted effort to enter these remote areas. While these areas allow public access, such access is not general in nature.

According to the ANR, the use of the ETC and WMA areas will increase following statewide trends. While ANR admits that prediction of future use cannot be done with any precision, they have estimated that snowmobile use might double in ten to twenty years. Other uses will only increase by less than 1 percent per year.[8]

While the use of these areas for such activities is without question, the vegetative pattern within these areas would appear to make extensive and long-duration views of the ridgeline the exception rather than the rule. We believe that most of these users will have intermittent and transitional views towards East Mountain.

How the project will be viewed is also a consideration. Studies have indicated that visual preference or acceptance of wind farm projects is often tied to the number of turbines that are visible from a single vantage point and the pattern in which they are viewed. Some works have concluded that the more visible structures the greater the influence on viewers. The more linear the pattern of turbines, the more favorably they are perceived.[9]

Section E: Critical Viewpoints

Based upon this viewshed analysis, the sensitivity of the landscape and recognizing the likely presence of the viewing public, we believe that four areas are of the most critical concern. These are:

1. Burke-Green Road in Burke and Newark;
2. Burke Mountain Toll Road in Burke;
3. Maidstone Lake in Maidstone; and,
4. Victory Bog near the public access.

These viewpoints have been depicted on Figures 5 to 8.

To better understand the potential visual impact from the project to some of these viewpoints, we have utilized our 3D computer model to prepare computer simulations of the likely view.

These simulations are not attempts to recreate nature or match existing photography. While such photomosaics and simulations are often done to ascertain how an element will be perceived, the fact is that each of these viewpoints is at such a distance that these sorts of analyses tend to exaggerate visibility and potential impact. Furthermore, the influence of environmental factors such as sun and atmosphere are difficult to accurately account for using photosimulation techniques. In this landscape scale, those factors may well play an important role in how the project is seen from points at distance.

[8] Land Access Plan – Private Timberlands of the Essex Timber Company, LLC. Page IV-17.
[9] van de Wardt, J.W. and Staats, H. (translation) (1988) Landscapes with wind turbines: environmental psychological research on the consequences of wind energy on scenic beauty. Research Centre ROV Leiden University.

The views from these critical viewpoints are generally open and obvious. Our computer modeling techniques allow us to understand the relationship between vegetation, atmosphere and topography at the same time. They help us visualize the relationship between the four turbines and the observers. While they are an inexact science, they are very useful in understanding the relationship between viewer and the landscape.

Burke-Green Road / Maple Ridge Road

This north-south route makes its way along a ridgeline between the town of Newark and Burke moving towards the Darling Hill area. Views from this perspective are from a distance of just under eight miles but are relatively unobstructed for much of the way due to the presence of open meadow foreground and working farmland. The views in some cases are large panoramas in which the observer can easily see Burke and Umpire Mountains to the south, and Seneca, East Haven and East Mountains to the east. Views of East Mountain would be either to the right or left side of the observer depending on the direction of travel along the roadway. While traveling south, Burke Mountain currently represents the strongest focal point within the landscape.

The turbines will be visible from this perspective, but will be at such an angle to the viewer as to make them appear to be closer together and falling away in perspective. The further south you travel along these roadways the more the turbines will appear to separate and become more individually discernable.

We have noted that the landscape within the viewshed is of an interesting character, but not especially unique to the region or Vermont. We have created a 3D computer simulation of the view from this area and believe that the images depicted in the T.J. Boyle report are somewhat misleading as they use focal lengths that tend to isolate and exaggerate the potential visibility from the viewpoint. Our simulations use a 50 mm focal length, and although we do not dispute the conclusion of the T.J. Boyle report that some long-range vistas might tend to focus the viewer into a narrower field of view (say 70 mm), the Burke-Green and Maple Ridge Roads have very expansive views and are generally focused on Burke Mountain to the south. See Figure 5 for a photographic summary from this position.

Toll Road at Burke Mountain

This area has two distinct characteristics; it is within a working ski area which generally services the local community through its extensive winter sports programs and it is within the Darling State Park, an area of both historic and aesthetic significance. This is a popular local and tourist destination throughout the year.

The view of the proposed project from the toll road is limited to a section at the crest of Burke Mountain just above the Poma lift. At this point a traveler along the road would be facing northeast and have East Haven Mountain in the mid-ground (at about 4 miles away) with East Mountain in the background at about 8.5 miles away.

Interestingly, the position of the view is such that one should see all four turbines clearly, but the majority of the structures will be hidden behind East Haven Mountain. Due to the distance to the proposed towers and the screening by East Haven Mountain, we have not prepared a computer simulation, but have provided

some existing condition photos that illustrate the view (Figure 6).

Maidstone Lake at the Boat Launch and Beach

Although Maidstone Lake State Park is just over 6 or so miles away from the proposed project site, East Mountain is clearly visible from the beach and boat launch area of the park. Two smaller foreground hills block much of the lower portions of East Mountain, but the ridgeline clearly rises above these obstructions. The existing radar building is clearly visible on a good day. The position of an observer from this perspective should allow all four turbines to be visible, although they will appear closer together and falling slightly downwards to the right. Much, if not all of the structure for one or more of the turbines should be visible as would the blades from all of them. The view toward East Mountain is nearly perpendicular to the beach making the view of the proposed project a more direct one. Foreground activities, however, will likely tend to draw the eye (particularly in summer months) with swimming, boating, etc. A simulated view from the beach is shown on Figure 7.

An additional view, located within the water and to the south of the beach, provides a more direct view of the ridgeline and turbines. From this vantage point a canoeist or boater could look between the foreground hillsides to see a majority of three of the turbines and a great deal of the last one.

Victory Bog

The Victory Bog area, near a public access point on River Road, is approximately 9.75 miles from the project area. Recently visited (December 2004), the site is generally open in the foreground with low vegetation consistent with bog ecosystems. In the midground rise several smaller hills that visually define the bog. Behind these ridgelines, the uppermost portion of East Haven Mountain is visible. The existing radar base components are clearly discernable. The background and midground do not appear highly layered from this vantage point.

From this vantage point all four of the proposed turbines will be visible. The western most three of the turbines will be entirely visible above the midground ridgelines. At this distance, however, they will be less visually obvious as the existing radar base structures owing to their proposed color and relative sizes. FAA lights will be visible from this vantage point.

It should be noted that this vantage point is not located at the public access point to the bog. The view from that position is blocked by existing vegetation. This view is located a few hundred feet up the road heading towards Granby. The duration of the view for the traveling public is approximately 20 to 30 seconds. Depending on the direction of travel the view is either to the driver's hard left or the passenger's hard right.

Given the distance to the proposed project site, we have not prepared a visual simulation for this viewpoint. We have provided two photographs (See Figure 8) showing existing conditions and noting where the proposed towers will be located.

Section F: Potential Impacts

The computer simulations and photographic images characterize the existing and potential view of the project site from four viewpoints identified as most critical. They do not evaluate specifically what impacts the project would have on such views or the visual resource.

All of the critical viewpoints have the convergence of three factors:

1. A visually sensitive landscape;
2. A direct or nearly direct view of one or more of the turbines; and,
3. A population of viewers who could routinely access the vantage point.

When all three of these factors are present, they point to a potential impact. The next step is to prepare an assessment of potential impacts using the Quechee Analysis. This process first tests whether the proposed project's impacts are adverse. Second, assuming one concludes that the project would have an adverse aesthetic impact, one must go on to determine whether or not that impact would be undue.

Test for Adverse Impact:

In order to assess a project's potential for adverse aesthetic impact, Quechee asks five basic questions that seek to determine if the project is out of context with the surrounding natural landscape. These questions are:

1. **What is the nature of the project's surroundings? Is the project located in an urban, suburban, rural or recreational resort area? What land uses presently exist? What is the topography like? What structures exist in the area? What vegetation is prevalent? Does the area have particular scenic value?**

   As discussed previously, the project is located within a rural and remote landscape of varying topography with heavy forest cover and relatively little developed infrastructure. Although the landscape is not unique in its form for the region or State, we consider it sensitive owing to its contrast, order and intactness.

2. **Is the project's design compatible with its surroundings? Is the architectural style of the buildings compatible with other buildings in the area? Is the scale of the project appropriate to its surroundings? Is the mass of the structures proposed for the site consistent with land use and density patterns in the vicinity?**

   With respect to the towers themselves, four wind turbines of 328 feet in height spread out over a 17 acre parcel along a ridgeline in a relatively undisturbed landscape would have to be described as incompatible with their surroundings. The scale of the proposed structures is quite large, particularly when seen from a short distance. As one moves away from the turbines they diminish.

   The lighting of the turbines to meet FAA requirements also introduces a level of incompatibility. The applicant appears to have been able to negotiate with the FAA to reduce the number of lights to one per turbine. This has been enabled by the inclusion of an automatic monitoring system that will notify the applicant if a light is out. The lights proposed are designed to be visible from 360 degrees horizontally.

A visit to the area during the evening of December 9 revealed that the nighttime sky of the region largely mimics its remoteness with large areas of relative darkness. These areas however, are punctuated by the occasional house light along ridges, high-pressure sodium parking lot lights in the Town of East Haven and apparent sky glow from Newport and the Lyndon State College parking facilities.

We do not believe that by itself the proposed lighting will have a significant impact on the aesthetics of the viewshed. During the day, the white lights will not be so visible as to draw the eye; the turbines themselves are of much more critical importance. At night, while the strobing red light will be visible from many vantage points it will not be visually dominating relative to other natural and manmade lights.[10] A viewer will likely have to look for these lights in the night sky rather than be automatically drawn to it. Obviously, at night, the towers themselves will not be visible.

3. **Are the colors and materials selected for the project suitable for the context in which the project will be located?**

The applicant has chosen colors (light gray and black) that tend to dissolve against the background of the sky. Observations made during site visits would appear to support the use of these colors.

4. **Where can the project be seen from? Will the project be in the viewer's foreground, middleground or background? Is the viewer likely to be stationary so that the view is of long duration or will the viewer be moving quickly by the site so that the length of view is short?**

As we have discussed, the project is visible from a range of vantage points. We have evaluated the viewshed and the level of public exposure and believe we have identified the four most critical viewpoints within the viewshed. Each of these view points has different visual durations, with Maidstone Lake being a view from a moderate distance but with a potentially long duration. Conversely, Burke-Green road is a long range view with a likely short duration due to the presence of foreground obstruction (trees) and the likely fact that the viewer will be moving. The Victory Bog area has a long-range view of the site with relatively short duration. Views within lands set aside for recreational access, including the Essex Timber Company landholdings, are also possible.

5. **What is the project's impact on open space in the area? Will it maintain existing open space or will it contribute to the loss of open space?**

The project is essentially a co-location site; albeit with a change in use. The site was and currently is impacted by developed infrastructure and is already largely cleared. The proposed site plan indicates very little clearing is necessary

[10] According to information provided by the applicant, the lighting will consist of a red flashing light (L864) for nighttime use and a white medium intensity flashing light for daytime use (L865). The L864 flashes at 20 flashes per minute (fpm), while the L865 flashes at 40 fpm. The lights are placed on the nacelle of the turbine and appear to be designed to reduce down lighting.

and that cleared areas will be allowed to revegetate naturally.

In sum, we believe that the project would result in an adverse impact to the surrounding visual resource due to the following:

1. The landscape context is sensitive to impacts.
2. The introduction of wind turbines of such scale and mass as proposed is incompatible with the general natural condition of the landscape. The presence of moving structures with day and night lighting would be unique and out of character against the largely static and intact conditions that presently exist.
3. The project will be visible from a variety of vantage points, including some with cultural and recreational importance. Views within lands established for passive recreational opportunities are also possible.

Test of Undue Impact:

Having concluded that the proposed project would result in an adverse impact on the aesthetics of the viewshed, it is now necessary to determine whether or not that adverse impact is also undue. The test for undue impact requires an examination and evaluation of three fundamental questions under Quechee.

1. **Does the project offend the sensibilities of the average person? Is it offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area?**

While we have concluded that the project does have elements that are out of character with the natural surroundings of the region, we do not believe the project would result in a shocking or offensive condition to the average person. The nature of the visibility of the project is such that most potential viewers (average persons) are not likely to be within 6 miles of the site. As discussed earlier, while we recognize that there may be some potential users of the recreational lands surrounding the project, we believe that in general the users of these lands are not properly classified as "average" persons under Quechee. Rather, they represent a unique and specific user group. Further, these unique users will often find themselves within areas where extensive forest cover will likely provide screening and visual isolation from the project.

2. **Does the project violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area?**

We have reviewed both the local and regional planning documents (East Haven and Northeastern Vermont Regional Development Association (NVDA)) with respect to specific language that might represent a clear standard with regards to aesthetics and scenic beauty.

While the regional plan (adopted September 2000) does outline goals that promote the protection of natural areas and preservation of rural character, it does so largely by encouraging local municipalities to adopt zoning language. It does outline some recommendations for development that municipalities

should consider when allowing development in rural areas:

- minimize their impacts on the rural character,
- do not strain municipal services,
- build along existing roads that can handle the traffic generated,
- discourage strip development, and
- require that driveways are properly constructed so as not to create a negative visual or traffic impact[11].

While this does provide some general guidance on the issue of development in rural areas, it does not provide a clear standard with respect to this petition. We believe that the intention of this document is to provide guidance to local municipalities in creating local policies to deal with a range of development pressures in rural areas.

With respect to East Haven, we have not found any specific language in the town regulations that presents a clear standard against which this project could be evaluated.

3. Has the Applicant failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the proposed project with its surroundings?

The applicant has chosen a site with a developed past as the potential location of the wind farm. The ridgeline structures associated with the historic radar station have long been a part of the landscape of the region and were easily noted from various vantage points. While the proposed use is different in many ways, the use of a site that had been previously impacted seems to be a reasonable step in attempting to reduce visual impacts. Use of the previously impacted site also allows the project to proceed without the need to build a new road or transmission corridor through the landscape, further limiting the impact that a project such as this might otherwise have[12]. Much like co-location for cellular towers is encouraged; an attempt to find a viewshed where a prior ridgeline development existed is noted in this instance. We suspect that such locations within the State are very few and far between.

In addition to selecting a previously impacted site, it is also worthy of note that the applicant has selected an isolated area with typically long range views, has selected colors that will tend to fade somewhat into a fairly typical sky with some cloud cover, and is attempting to further negotiate the FAA's lighting requirements to reduce the visual impacts of the lights.

However, there is one concern that is appropriately addressed at this point. While the Department believes that an interpretive exhibit is appropriate to both mitigate the impact of the project on the historic quality of the former radar base and to educate the public about the benefits of wind power, we do not believe that the exhibit needs to be placed on the summit of East Mountain. Placing either an

[11] Regional Plan for the Northeast Kingdom, page 30. September 2000, Northeastern Vermont Regional Development Authority.

[12] The transmission corridor discussed in this review only address the area from the summit down to an area near the Village of East Haven. Additional transmission beyond this point has not been evaluated as part of this visual assessment.

interpretive center or exhibit at the summit would tend to negate the mitigating effects of the project's isolation by drawing potentially thousands of visitors annually to the site of the project. For example, an exhibit placed within the Village of East Haven could provide the requested mitigations in a setting that is visually isolated from the proposed wind farm, convenient to major roadways and public services.

Part III: Conclusions

Section A: General Conclusions

1. The visual analysis prepared by the applicant seems reasonable.

2. We have calculated a projected viewshed from the 4-turbine demonstration project and it appears to match reasonably well with the projection completed for the applicant. Small variations due to differences in software are noted.

3. The viewshed is generally focused towards the south and east in the immediate vicinity of the project (2-6 miles), while further out some areas of visibility are noted along higher ridgelines or in areas where gaps in topography may allow slight glimpses.

4. Much of the area surrounding the project is either private forest land or public lands either purchased during the Champion Lands deal or state forests and parks. Most notably is Darling State Park to the south and west and Maidstone Lake State Park to the east. We believe that much of the WMA and ETC lands are not "public" with respect to our analysis because they require considerable and concerted effort to reach and are not generally accessible. Additionally, the numbers and duration of visitors to these areas is not well known, but has been characterized as relatively low. ANR indicates that the largest uses are hunting and snowmobiling, but these activities are generally limited and often occur within areas where forest canopy will afford screening.

5. The pattern of forest cover within the landscape is extensive and significantly reduces the size of the potential viewshed. Although some areas in the Town of Ferdinand might have a potential for viewing one or more of the turbines, the likelihood of an unobstructed and invasive view is remote.

   Four areas of particular interest have arisen in our analysis; Maidstone Lake, Burke-Green Road Toll Road at Burke Mountain, and the Victory Bog. All four are clearly public with the lake and the toll road comprising public gathering points. Of the four, Burke-Green Road will have the best and closest view of the entire ridgeline. The Victory Bog area has also been noted, but is of a long-range (9.75 miles) and of relatively short duration for the traveling public in motorized vehicles (20-30 seconds).

6. We do not fully concur on the Quechee Analysis completed by the applicant. Overall, we feel that a project of this type, given the natural and untouched qualities of this landscape in which it will exist, will at the very minimum result in an adverse impact to visual and aesthetic qualities. The fact that the site was an old radar base is a consideration, but we must recognize that the viewshed of this project is much larger than that of the radar base and if the base were reviewed under current standards, these issues would be raised.

7. We do, however, concur that the likely route of the transmission lines (to the Village of East Haven) will not be adverse in and of itself. The corridor is small and exists along Radar Road. We do not feel that this will create an adverse burden on aesthetic resources.

8. We also generally concur on the issue of lighting. In principal, the amount of lighting that is required by the FAA is so small in that, although they will not appear as "stars", they will probably not draw significant attention.

9. We strongly disagree with the Peter Owen testimony and feel that it is not appropriate as Quechee is the legitimate test for aesthetic evaluation in Vermont. The Quechee approach has been successful in large measure due to its reliance on three fundamental tests; a test for community compatibility, a test for individual compatibility and a test for the applicant's sensitivity to the visual environment. The contextual approach outlined in Mr. Owen's testimony would allow for almost unlimited development of windfarms on Vermont's ridgelines with little or no review of their aesthetic impacts. Mr. Owen's analysis is really little more than an economic analysis: windfarms belong on ridgelines because that is where they function profitably. He has substituted an economic rationale for aesthetic analysis. We believe that each project needs to be evaluated on its merits and against the overarching goal of balancing growth with its' associated impacts.

10. We agree that there are no clear written community standards in either the local or regional planning documents that directly address the aesthetics issues raised by this application. There is discussion about the need to protect open lands and to preserve the character of the region. No specific regulations are noted in the management plans for Maidstone Lake State Park. It is our experience that more specific standards than those found in the regional plan are generally required to fail this test under Quechee.

11. While we do believe that projects of this nature can be shocking, we feel that in this particular context the distance between the proposed project and the viewing public will greatly reduce their perception and the likelihood to "shock". While we are concerned about the views from lands that are not generally "public" but do have a quasi-public role in the outdoor recreational activities of many Vermonters and tourists, we also believe that such views will be very limited, remote and typically highly screened.

12. We believe that the most effective mitigation the applicant is making in regards to aesthetics is in placing the project on a site that is remote, a former military installation and previously impacted. On a lesser scale, the applicant has chosen tower shapes and colors that will help the structures fade into the background under typical conditions and note the ongoing efforts to reduce the FAA lighting

requirements. We believe that locating an interpretive center at the summit of East Mountain is not a good idea as it reduces the mitigation realized by the project's isolation. Inviting persons to visit the site could reinforce their scale and disharmonious character to the surrounding natural beauty.

13. We conclude that based on the data reviewed to date, while the overall project will have an adverse impact on the aesthetic quality of the surrounding area, that impact is not undue. We have serious reservations about extension of the project to other ridgelines. The isolation and remoteness of the site provide considerable benefits against causing aesthetic impacts. Modifying or expanding the site could dramatically increase the extent of visibility and reduce the capacity of the landscape to absorb additional impacts.